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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2012 Fisheries Management Survey Report

# Buffalo Springs Reservoir


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## SURVEY AND MANAGEMENT SUMMARY

Fish populations in Buffalo Springs Reservoir were surveyed in 2012 using electrofishing and trap nets and in 2013 using gill nets. Historical data are presented with the 2012-2013 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Buffalo Springs is a 225-acre reservoir that was impounded in 1960 on Yellowhouse Draw, a tributary of the North Fork of the Double Mountain Fork of the Brazos River, located 5 miles southeast of Lubbock, Texas. It is owned by the Lubbock County Water Control and Improvement District Number 1 and used for recreational purposes. Water level has been stable and nutrient levels in the reservoir are extremely high. A large portion of fish habitat was cattail. Bank and boat access was good and handicap specific facilities were good. The reservoir has experienced *Prymnesium parvum* (golden alga) kills beginning in 2003 which have had a major impact on the fish populations.

- **Management History:** The sport fish populations have been managed with statewide regulations. Intensive Striped Bass stocking was used to manage an overabundant Gizzard Shad population with good success.

- **Fish community**
  - **Prey species:** There was a very high number of Gizzard Shad sampled during electrofishing in 2012, and 94% of the shad are small enough to be utilized as prey. Bluegill numbers have declined, and the population was dominated by fish 5 inches or smaller.

  - **Catfishes**: Blue Catfish were stocked in 2003, 2007, and 2009 to reestablish the species following *P. parvum* fish kills. One Blue Catfish was collected in 2011 and two were collected in 2013; these are the first Blue Catfish collected in gill nets since 2005. No Channel Catfish were collected in gill nets in 2009; however, gill net surveys from 2011 and 2013 show a recovering Channel Catfish population.

  - **Temperate bass:** Historically, White Bass have been present in the reservoir; however, only one White Bass has been sampled in gill nets since 2001. The gill net catch rate for Striped Bass was 0.4/nn in 2013.

  - **Largemouth Bass:** The electrofishing catch rate for Largemouth Bass has increased from 10.0/h in 2008 to 32.0/h in 2012. Size structure was dominated by smaller individuals, but has improved somewhat.

  - **White Crappie:** The trap net catch rate for White Crappie was 0.2/nn in 2012. Only one fish was collected in trap net surveys.

- **Management Strategies**
  Based on current information, the reservoir should continue to be managed with existing regulations. Continue stocking Striped Bass to help maintain control of the Gizzard Shad population. Striped Bass should be stocked on an alternating basis at a rate of 15/acre and 40/acre in two consecutive years and then two years of no stocking based on protocols used during research conducted by Schramm et al. (2000). The reservoir should be monitored for *P. parvum* and associated fish kills. Mitigation of kills by stocking should be conducted as soon as practical.

# INTRODUCTION

This document is a summary of fisheries data collected from Buffalo Springs Reservoir in 2012-2013. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While data on other species of fish were collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems or opportunities. Historical data are presented for comparison.

## *Reservoir Description*

Buffalo Springs is a 225-acre reservoir impounded in 1960 on Yellowhouse Draw, a tributary of the North Fork of the Double Mountain Fork of the Brazos River, located 5 miles southeast of Lubbock, Texas. It is owned by the Lubbock County Water Control and Improvement District Number 1 and used for recreational purposes. The City of Lubbock, TX discharges its treated effluent into Yellowhouse Draw which allows water level in the lake to remain stable; however, nutrient levels are extremely high. Buffalo Springs is characterized as a hypereutrophic lake with a mean Trophic State Index chl-a of 69.9 (Texas Commission on Environmental Quality 2011). Bank and boat access was good and handicap specific facilities have been improved since the last report. The reservoir experienced a significant *Prymnesium parvum* (golden algae) kill during 2003 which had a major impact on the fisheries. The reservoir experienced another kill in 2005 and small annual kills since. Additional reservoir characteristics are presented in Table 1.

## *Angler Access*

Buffalo Springs Reservoir has three public boat ramps. Due to stable water level all boat ramps were available to anglers. Additional boat ramp characteristics are listed in Table 2. Shoreline access is good; fishing is allowed in all open areas of the shoreline on the reservoir, with the exception of the bridge located near the marina. There is also a covered fishing dock located near the marina bridge and several small public fishing docks located around the reservoir.

## *Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Munger and Clayton 2009) included:

1. Re-establish Redbreast Sunfish population and monitor by electrofishing.
   **Action:** Redbreast Sunfish have not been re-established in the reservoir due to continued *Prymnesium parvum* blooms and related fish kills. This species appears to be very sensitive to *P. parvum* and should not be restocked until blooms abate.

2. Stock Striped Bass to help control Gizzard Shad population. Stock at an adjusted rate of 15/acre and 40/acre in two consecutive years followed by two years of no stocking.
   **Action:** Due to *P. parvum* blooms within the state hatchery system during culture of Striped Bass, production has been limited. Buffalo Springs has not been stocked with Striped Bass since 2008.

3. Monitor *P. parvum* blooms.
   **Action:** Contacts have been made with Buffalo Springs Reservoir staff and they are monitoring for fish kills. On two occasions, Buffalo Springs Reservoir staff contacted the district Inland Fisheries office to report a possible fish kill. Water samples were collected, and the cause of the kill was confirmed by Texas Parks

& Wildlife Department staff. A reported kill in spring 2011 was determined to be due to blue-green alga, and in 2012 a *P. parvum* bloom resulted in a small isolated kill near the marina.

**Harvest regulation history:** Sportfishes in Buffalo Springs Reservoir have been and continue to be managed with statewide regulations (Table 3).

**Stocking history:** Buffalo Springs Reservoir has been stocked with Blue Catfish, Channel Catfish, Striped Bass, Bluegill, and Florida Largemouth Bass multiple times since 2003 in an effort to mitigate the effects of fish kills and reestablish populations. The reservoir was experimentally stocked with walleye (1978-1981) Red Drum (1983), and Northern Pike (1975-1976) with limited success. The complete stocking history is in Table 4.

**Vegetation/habitat management history:** Vegetation in Buffalo Springs Reservoir is limited to cattail and bulrush. In order to maintain shoreline fishing access, the water authority has periodically removed problematic vegetation with use of an excavator.

## METHODS

Fishes were collected by fall electrofishing (1.0 hours at 12, 5-minute stations), spring gill nets (5 net nights at 5 stations), and fall trap nets (5 net nights at 5 stations). For electrofishing and gill netting, fish sampling was conducted at randomly selected sites. Trap net sites were historically utilized biologist selected. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for gill and trap nets, as the number of fish per net night (fish/nn). A habitat survey was conducted August, 2012. All sampling was conducted according to Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight ($W_r$)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE statistics.

## RESULTS AND DISCUSSION

**Habitat:** A habitat survey was conducted August, 2012. Primary habitat was natural shoreline (75%) followed by bulkhead (18.7%) (Table 5). Aquatic vegetation was limited to cattail and bulrush, primarily along natural shoreline areas (Table 6).

**Prey species:** Electrofishing catch rates of Gizzard Shad and Bluegill were 822.0/h and 26.0/h, respectively. Index of vulnerability (IOV) for Gizzard Shad was good, indicating 94% of Gizzard Shad were available to existing predators; this was similar to the IOV estimate from 2009 and 2010 (Figure 1). Total CPUE of Gizzard Shad has increased steadily since the 2008 survey (Figure 1). Total CPUE of Bluegill in 2012 (26.0/h) was much lower than the 2010 survey (152.0/h) but similar to 2008 (39.0/h). Size structure continued to be dominated by small individuals (Figure 2).

**Blue Catfish:** One 11-inch Blue Catfish was collected in the 2011 gill net survey, and two (16-inch and 17-inch) were collected in 2013; these are the first Blue Catfish collected in gill nets since 2005.

**Channel Catfish:** No Channel Catfish were collected in gill nets in 2009; however, catch rates from gill net surveys in 2011 (2.6/nn) and 2013 (10.4/nn) show that the Channel Catfish population was recovering from *P. parvum* blooms (Figure 3).

**Striped Bass:** The gill net catch rate of Striped Bass in 2013 (0.4/nn) consisted of 2 fish. Both fish measured $\geq$ 24 inches (Figure 4). Catch rates have declined from 2011 (7.2/nn) but were the same as 2009 (0.4/nn). The declining population can be attributed to lack of stockings since 2008.

**Largemouth Bass:** P*. parvum* blooms since 2003 appear to have severely affected the population, but there does appear to be improvement. The electrofishing catch rate of Largemouth Bass was 32.0/h in 2012, an increase from 2010 (14.0/h) and 2008 at 10.0/h (Figure 5). Even though the current population appears to be dominated by sub-legal size fish, size structure has improved over the past four years moving from a PSD of 0 in 2008 to a PSD of 50 in 2012. Only one legal size fish was collected in 2012.

**White Crappie:** The trap net catch rate of White Crappie was 0.2/nn in 2012 (Figure 6), which was much lower than 2008 (8.2/nn) but similar to 2004 (0.6/nn). Only one 5 inch fish was collected in 2012. The crappie population appears to fluctuate greatly since *P. parvum* blooms began in 2003.

**Fisheries management plan for Buffalo Springs Reservoir, Texas**

Prepared – July 2013

**ISSUE 1** Striped Bass are an important top level predator in Buffalo Springs Reservoir and they provide additional recreation to anglers. Historically, Buffalo Springs was characterized as having an overabundant Gizzard Shad population comprised mostly of adult shad too large to be used as prey. Schramm, et al. (2000) found that the Gizzard Shad population in Buffalo Springs could be restructured to be more conducive to predation by stocking large numbers of Striped Bass. Striped Bass do not reproduce in Buffalo Springs and stocking is required to maintain their abundance.

MANAGEMENT STRATEGY

1. Stock fingerling Striped Bass on an alternating basis where they are stocked at a rate of 15/acre and 40/acre in two consecutive years followed by two years of no stocking.

**ISSUE 2** The reservoir experienced a severe fish kill in 2003 due to *P. parvum.* There have been repeated smaller kills in the years following the initial kill, but these have been much smaller and primarily restricted to the upper reservoir.

MANAGEMENT STRATEGIES

1. Maintain contacts with reservoir management authority to monitor for fish kills.
2. Collect quarterly water samples for *P. parvum* cell counts to determine concentration and estimate toxicity.

**ISSUE 3:** Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species through the use of media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

**SAMPLING SCHEDULE JUSTIFICATION:**

The proposed sampling schedule is a continuation of the current schedule and includes additional electrofishing and gill netting in 2015-2016, and a full management survey in 2016-2017 (Table 5). Additional electrofishing and gill net surveys are necessary to monitor impact of periodic golden algae blooms and the effects on sportfish populations. Trap netting once every four years is adequate for detecting absence or presence of White Crappie.

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Table 1. Characteristics of Buffalo Springs Reservoir, Texas.

| Characteristic | Description |
|---|---|
| Year constructed | 1960 |
| Controlling authority | Lubbock County WC&ID No. 1 |
| County | Lubbock |
| Reservoir type | Tributary |
| Shoreline Development Index (SDI) | 3.56 |
| Conductivity | 1096 µmhos/cm |

Table 2. Boat ramp characteristics for Buffalo Springs Reservoir, Texas, August, 2012.

| Boat ramp | Latitude Longitude (dd) | Public | Parking capacity (N) | Elevation at end of boat ramp (ft) | Condition |
|---|---|---|---|---|---|
| Marina Ramp | 33.53056 -101.70933 | Y | 30 | Unknown | Excellent, no access issues |
| Water Park Ramp | 33.53255 -101.70460 | Y | 15 | Unknown | Excellent, no access issues |
| Old Gate Ramp | 33.53241 -101.72361 | Y | 30 | Unknown | Excellent, no access issues |

Table 3. Harvest regulations for Buffalo Springs Reservoir, Texas.

| Species | Bag limit | Length limit |
|---|---|---|
| Catfish, Blue and Channel, their hybrids and subspecies | 25 (in any combination) | 12-inch minimum |
| Catfish, Flathead | 5 | 18-inch minimum |
| Bass, White | 25 | 10-inch minimum |
| Bass, Striped | 5 | 18-inch minimum |
| Bass, Largemouth | 5 | 14-inch minimum |
| Crappie, White | 25 | 10-inch minimum |

Table 4. Stocking history of Buffalo Springs Reservoir, Texas. FRY = fry; FGL = fingerling; ADL = adults; UNK = unknown.

| Species | Year | Number | Size |
|---|---|---|---|
| Northern Pike | 1975 | 2,719 | UNK |
| | 1976 | 5,940 | UNK |
| | Total | 8,659 | |
| Blue Catfish | 1984 | 13,120 | UNK |
| | 2003 | 5,635 | FGL |
| | 2007 | 25,164 | FGL |
| | 2009 | 24,432 | FGL |
| | Total | 68,351 | |
| Channel Catfish | 1966 | 12,500 | UNK |
| | 1967 | 13,000 | UNK |
| | 1968 | 12,000 | UNK |
| | 1969 | 5,500 | UNK |
| | 1970 | 12,540 | UNK |
| | 1971 | 15,000 | UNK |
| | 1972 | 10,500 | UNK |
| | 1973 | 10,000 | UNK |
| | 1974 | 5,000 | UNK |
| | 1975 | 5,000 | UNK |
| | 1977 | 5,000 | UNK |
| | 2005 | 58 | ADL |
| | Total | 106,098 | |
| Flathead Catfish | 1973 | 1,500 | UNK |
| Striped Bass | 1983 | 11,450 | UNK |
| | 1984 | 11,000 | UNK |
| | 1986 | 13,500 | UNK |
| | 1988 | 27,416 | UNK |
| | 1989 | 28,400 | UNK |
| | 1990 | 5,110 | FGL |
| | 1991 | 4,500 | FGL |
| | 1992 | 50,621 | FGL |
| | 1993 | 50,450 | FGL |
| | 1998 | 3,486 | FGL |
| | 1999 | 9,487 | FGL |
| | 2002 | 3,428 | FGL |
| | 2003 | 9,752 | FGL |
| | 2005 | 3,686 | FGL |
| | 2006 | 11,619 | FGL |
| | 2008 | 3,988 | FGL |
| | Total | 247,893 | |
| Green X Redear Sunfish | 1970 | 5,000 | UNK |
| Bluegill | 2004 | 64,550 | FGL |
| | 2007 | 24,597 | FGL |
| | Total | 89,147 | |

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Table 3. Continued

| Species | Year | Number | Life stage |
|---|---|---|---|
| Largemouth Bass | 1966 | 36,000 | FGL |
| | 1967 | 10,500 | FGL |
| | 1968 | 6,450 | FGL |
| | 1969 | 5,000 | FGL |
| | 1970 | 10,000 | FGL |
| | 1971 | 7,000 | FGL |
| | 1991 | 3,050 | FGL |
| | Total | 78,000 | |
| Florida Largemouth Bass | 1982 | 3,000 | FGL |
| | 1983 | 10,500 | FGL |
| | 1984 | 2,400 | FGL |
| | 1985 | 2,000 | FGL |
| | 2003 | 24,316 | FGL |
| | 2004 | 25,019 | FGL |
| | 2005 | 25,105 | FGL |
| | 2007 | 24,361 | FGL |
| | 2009 | 24,008 | FGL |
| | 2011 | 24,141 | FGL |
| | Total | 164,850 | |
| Walleye | 1978 | 1,124,775 | FRY |
| | 1979 | 500,000 | FRY |
| | 1980 | 1,102,500 | FRY |
| | 1981 | 2,345,000 | FRY |
| | Total | 5,072,275 | |
| Red Drum | 1983 | 27,900 | UNK |

Table 5. Survey of structural habitat types, Buffalo Springs Reservoir, Texas, 2012. Shoreline habitat type units are in miles.

| Habitat type | Estimate | % of total |
|---|---|---|
| Natural shoreline | 6.0 miles | 75 |
| Bulkhead | 1.5 miles | 18.7 |
| Rock shore | 0.4 miles | 5 |
| Bulkhead + piers | 0.1 miles | 1.3 |

Table 6. Survey of aquatic vegetation, Buffalo Springs Reservoir, Texas 2008 – 2012. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

| Vegetation | 2008 | 2012 |
|---|---|---|
| Native emergent | 4.6 (1.9%) | 5.6 (2.3%) |

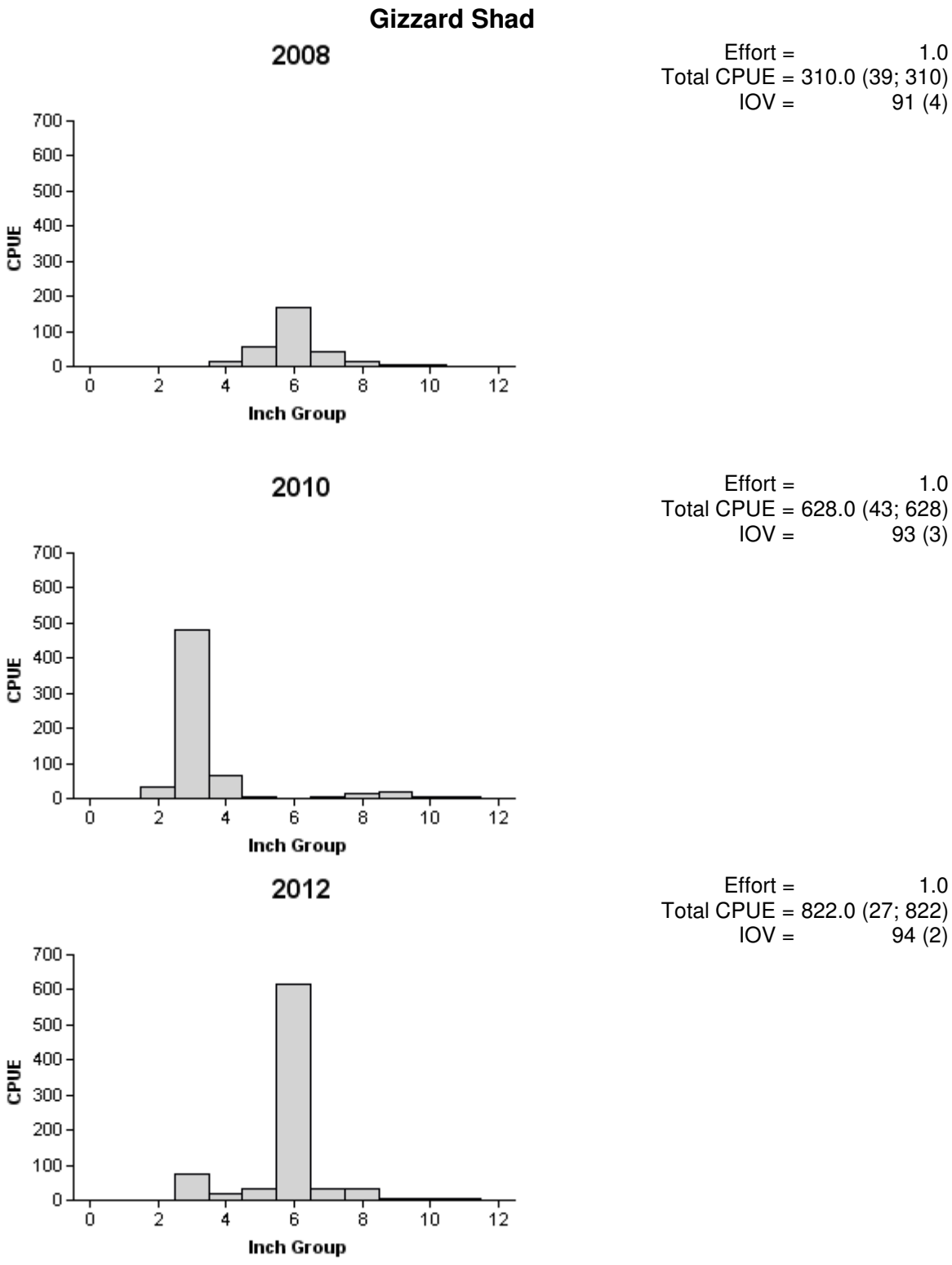



Figure 1. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Buffalo Springs Reservoir, Texas, 2008, 2010, and 2012.

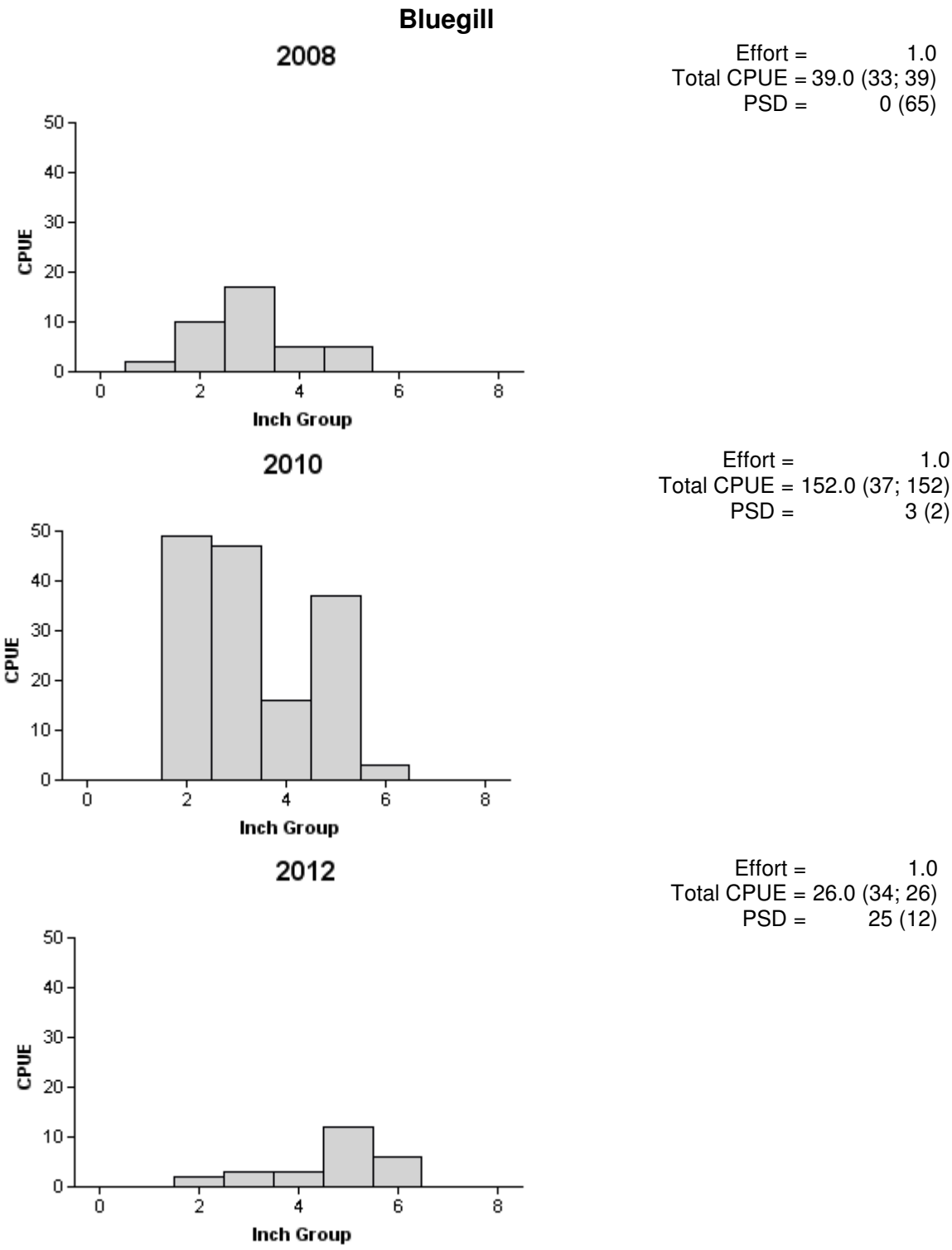



Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Springs Reservoir, Texas, 2008, 2010, and 2012.

## Channel Catfish

No Channel Catfish were collected in 2009

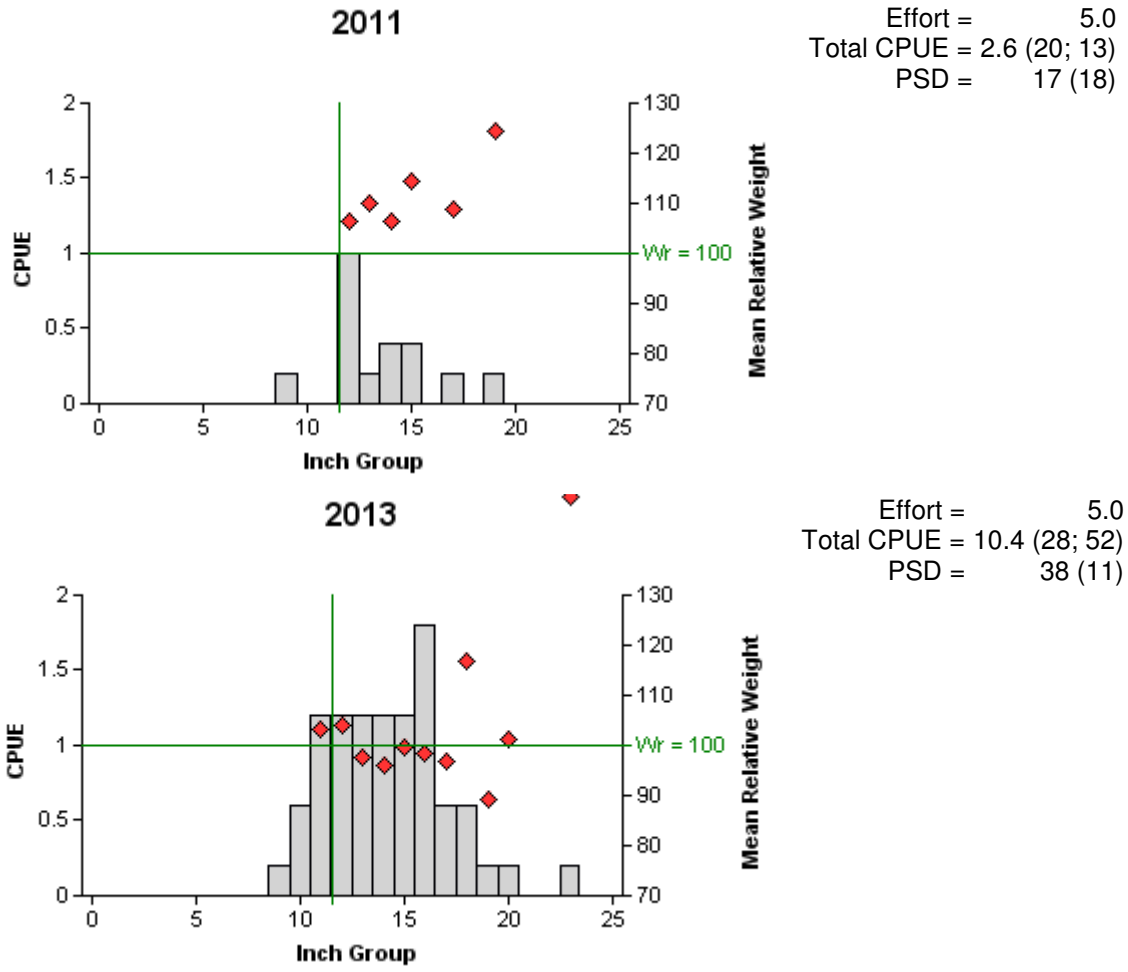



Figure 3. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Buffalo Springs Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents minimum length limit of 12 inches, and horizontal line represents relative weight of 100.

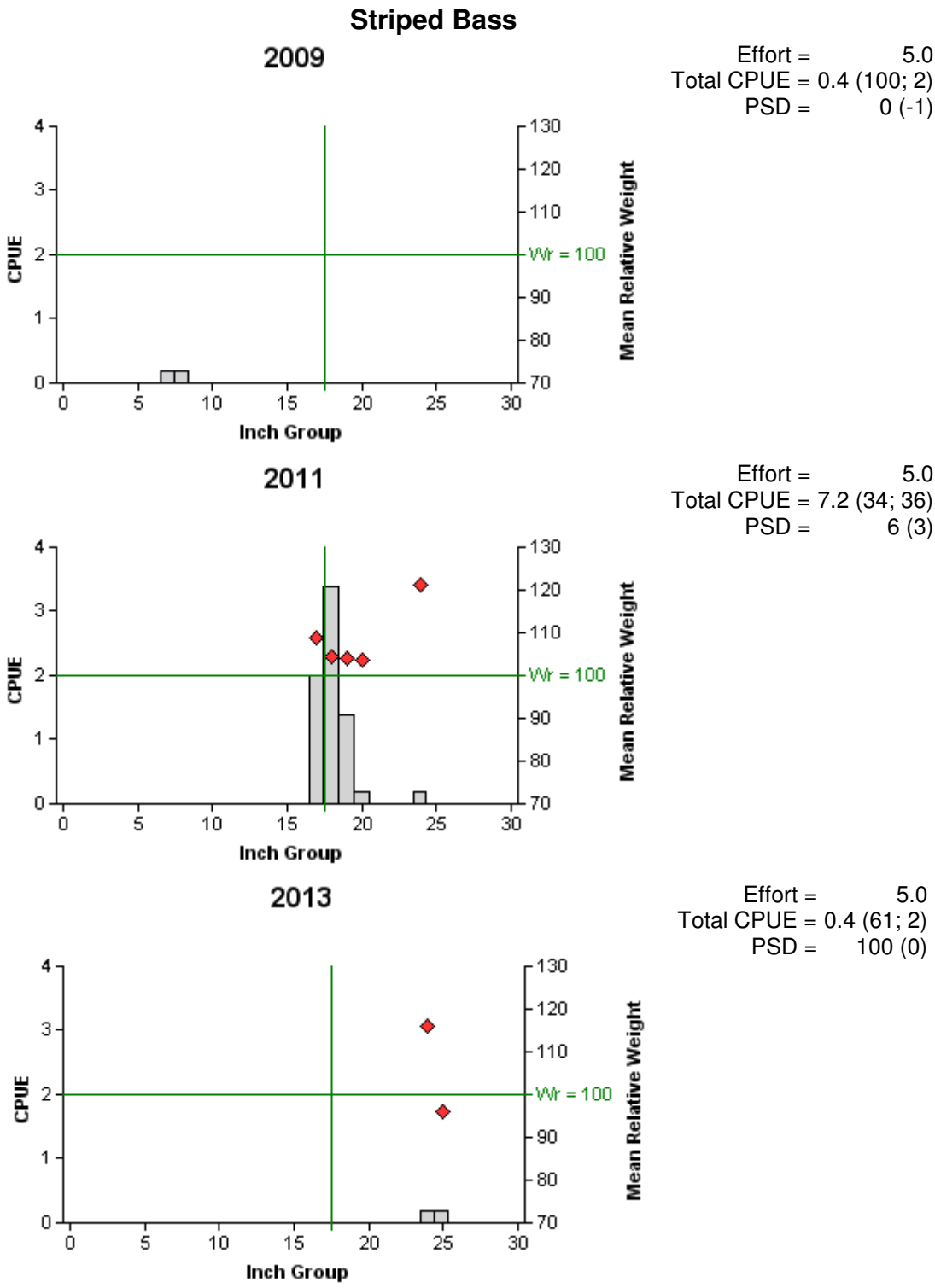



Figure 4. Number of Striped Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Buffalo Springs Reservoir, Texas, 2009, 2011, and 2013. Vertical line represents minimum length limit of 18 inches, and horizontal line represents relative weight of 100.

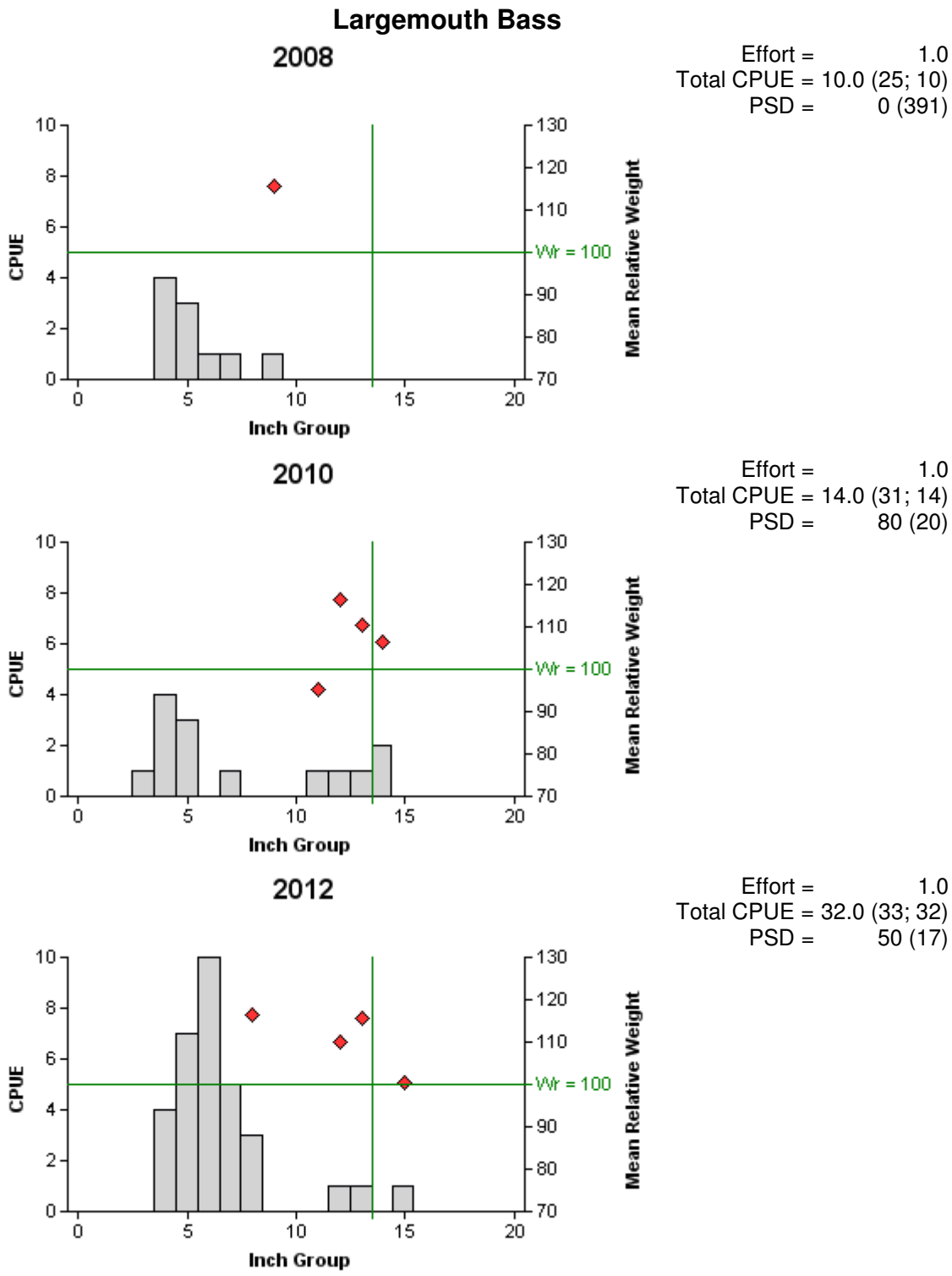



Figure 5. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Buffalo Springs Reservoir, Texas, 2008, 2010, and 2012. Vertical line represents minimum length limit of 14 inches, and horizontal line represents relative weight of 100.

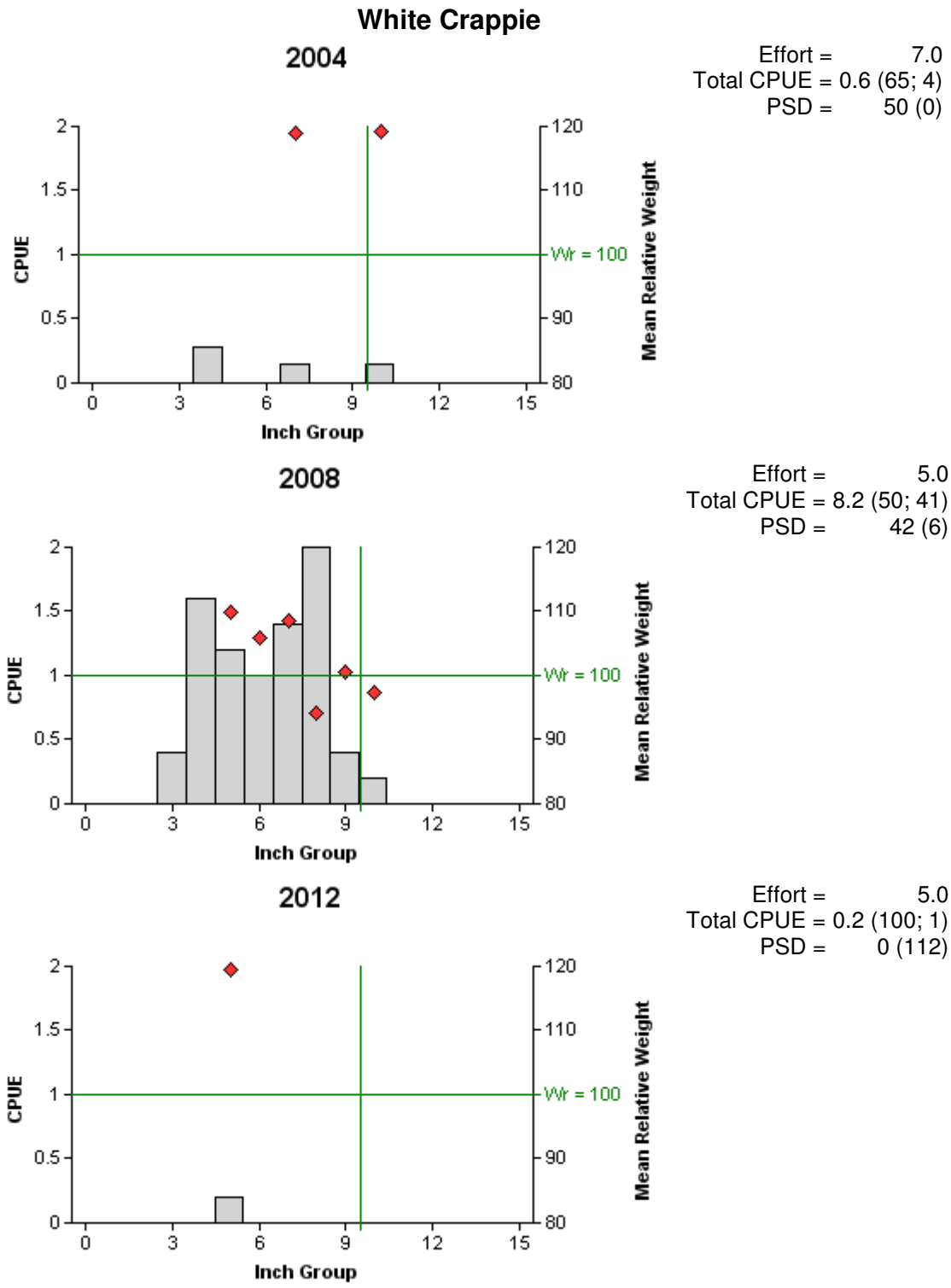



Figure 6. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Buffalo Springs Reservoir, Texas, 2004, 2008, and 2012. Vertical line represents minimum length limit of 10 inches, and horizontal line represents relative weight of 100.

Table 7. Proposed sampling schedule for Buffalo Springs Reservoir. Trap net and electrofishing surveys are conducted in the fall while gill net surveys are conducted in the spring. The letter S indicates standard sampling and additional surveys are denoted by A.

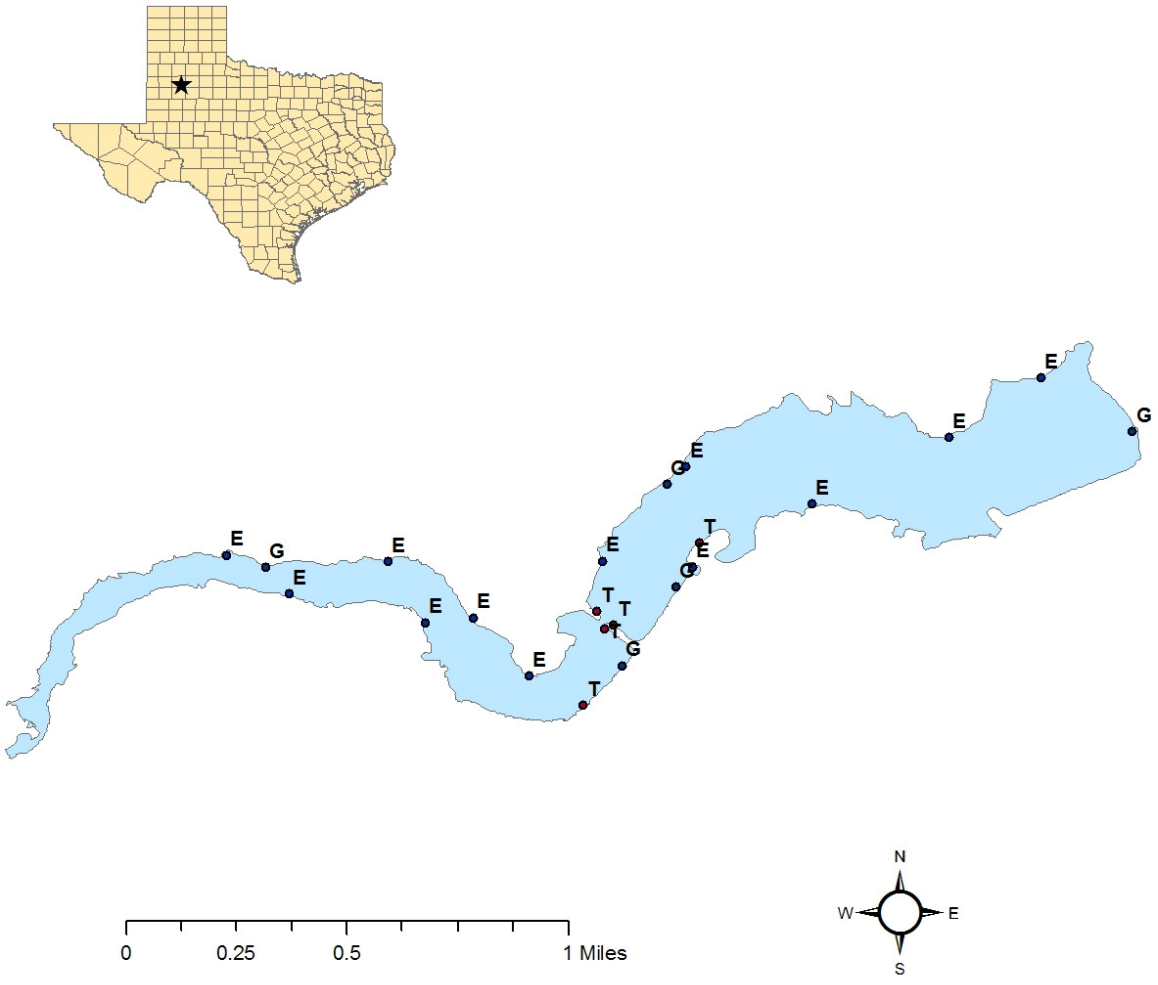
| Survey year | Electrofish Fall(Spring) | Trap net | Gill net | Habitat | | Access | Creel survey | Report |
|---|---|---|---|---|---|---|---|---|
| | | | | Structural | Vegetation | | | |
| 2013-2014 | | | | | | | | |
| 2014-2015 | A | | A | | | | | |
| 2015-2016 | | | | | | | | |
| 2016-2017 | S | S | S | | S | S | | S |

## APPENDIX A

Number (N) and catch rate (CPUE) of all species collected from all gear types from Buffalo Springs Reservoir, Texas, 2012-2013.

| Species | Gill Netting | | Trap Netting | | Electrofishing | |
|---|---|---|---|---|---|---|
| | N | CPUE | N | CPUE | N | CPUE |
| Gizzard Shad | 212 | 42.4 | 2 | 0.4 | 822 | 822.0 |
| Common Carp | 86 | 17.2 | 19 | 3.8 | 377 | 377.0 |
| Blue Catfish | 2 | 0.4 | | | | |
| Black Bullhead | 50 | 10.0 | 35 | 7.0 | 38 | 38.0 |
| Channel Catfish | 52 | 10.4 | | | 3 | 3.0 |
| Striped Bass | 2 | 0.4 | | | 1 | 1.0 |
| Green Sunfish | 16 | 3.2 | 1 | 0.2 | 56 | 56.0 |
| Orangespotted Sunfish | | | 2 | 0.4 | | |
| Bluegill | 7 | 1.4 | 5 | 1.0 | 26 | 26.0 |
| Longear Sunfish | | | | | 5 | 5.0 |
| Largemouth Bass | 6 | 1.2 | | | 32 | 32.0 |
| White Crappie | 4 | 0.8 | 1 | 0.2 | | |

**APPENDIX B**




Location of sampling sites, Buffalo Springs Reservoir, Texas, 2012-2013. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively.